

Project Title: Enhancing Decision Support for Drought Risk in the United States:
The Drought Risk Atlas

Funding Agency: Department of Commerce

Office: National Oceanic and Atmospheric Administration (NOAA)
Climate Program Office--Sectoral Applications Research Program (SARP):
Coping with Drought and the National Integrated Drought Information System
(NIDIS)

Award Number: NA12OAR4310095

PI: Mark Svoboda, National Drought Mitigation Center, University of
Nebraska-Lincoln

msvoboda2@unl.edu

402-472-8238

Annual Project Progress Report: (May 1, 2014 – April 30, 2015)

Highlighted Results and Accomplishments from Year 3

In order to meet the four Scientific Objectives outlined in our project, the specific tasks that the NDMC and our NOAA partners proposed to accomplish include the following, along with our progress-to-date over the past year:

1) Update the Drought Risk Atlas (DRA) data set annually during the life of this project.

- Initially, data screening was to be completed through 2009 and was later updated thru 2012 for this project in order to capture the exceptional droughts that occurred in the Southern Great Plains and the Midwest. *That will be the last update for the duration of this project.*
- Checked for inclusion of new stations that meet our long-term station data screening criteria from 2010-2012 (not previously included in the DRA database). *This is an ongoing process.*
 - A student intern at the NDMC has been working on updating the list of viable stations to include in the DRA. She has looked at stations which were not included in the first release of the DRA but now have a long enough period of record to be included. *Ongoing.* (May 2014).

Database Maintenance/Management

- Added additional QC processes for the aggregation process on the database to deal with serially complete data issues (May – Jul 2014)
- Database Schema changes to handle the additional QC tracking data (May – Jul. 2014)
- Updated the indices in the database from the final QC'd serially complete data clearing up some lingering issues in the very early portion (1900-1918) of the DRA record (Jul. 2014)
- Added additional tools for importing datasets into the database for future updates (Oct. – Nov. 2014)

Data Creation

- Created gridded data for SPI (time-steps 1-12, 18, 24, 36w from weekly raw data (Sep. 2014)
- Created gridded data for SPI from weekly serially complete data (Sep. 2014)
- Created gridded data for SPI from monthly raw data (Sep. 2014)
- Created gridded data for SPI from monthly serially complete data (Sep. 2014)
- Created WMS services for SPI from weekly raw data grids (Oct. 2014)
- Created WMS services for SPI from weekly serially complete data grids (Oct. 2014)
- Created WMS services for SPI from monthly raw data grids (Oct. 2014)
- Created WMS services for SPI from monthly serially complete data grids (Oct. 2014)

Database Access

- Nothing new to report

2) **Compute five drought indices using both the raw and serially complete data sets.**

- **COMPLETED:** All indices (SPI/SPEI/sc-PDSI/PDSI and Deciles) were generated and archived in the database in Year 2.

3) **Provide analog indices and climatic data for historical comparison purposes.**

- **COMPLETED:** Data were generated and archived in Year 2 prior to the web launch.

4) **Generate ~500,000 gridded raster maps using ArcGIS for all indices and for all weeks in the period of record.**

- Created maps for SPI from weekly raw data grids (Oct. 2014)
- Created maps for SPI from weekly serially complete data grids (Oct. 2014)
- Created maps for SPI from monthly raw data grids (Oct. 2014)
- Created maps for SPI from monthly serially complete data grids (Oct. 2014)

- After final checks and runs of serially complete stations, the SPEI and PDSI/sc-PDSI maps will be generated in summer 2015

5) Refine the Web-based delivery system.

Climate Map

- **COMPLETED:** Was pushed out in Year 2 prior to web launch. **(Will continue updating as needed)**

Climate Data Tool

- **COMPLETED.** **(Will continue updating as needed)**

Data Handling

- Added ability to export results with international decimal format (Oct. 2014)
- Added ability to export results with international date format (Oct. 2014)
- Added ability to export results as csv (Oct. 2014)
- Added ability to import input file with date as column of input file (Oct. 2014)
- Updated daily to monthly compounding routine to average temperatures (Oct. 2014)
- Add ability to import a file with daily data (Oct. 2014)
- Added ability to export results with international decimal format (Nov. 2014)
- Added ability to export results with international date format (Nov. 2014)
- Added ability to export results as csv (Nov. 2014)
- Added ability to import input file with date as column of input file (Nov. 2014)
- Updated daily to monthly compounding routine to average temperatures (Nov. 2014)
- Add ability to import a file with daily data (Nov. 2014)
- Exceptions are logged in a file and saved to the output directory or application directory (Dec. 2014)
- Added better exception handling to command line and windows application
- Added .cor, .csv, and .dat extensions for directory processing
- Added weekly option to SPEI index creation application (Jan. – Feb. 2015)

Web Interface

- Added tools to the Web Viewer to allow users access to the SPI WMS services (Oct. 2014)
- Added tool to allow users to access the archived SPI maps (Oct. – Nov. 2014)
- Updated code in to fix inconsistencies in the way frequencies were being calculated for the web tools. (Jan. 2015)
- Updated graphing tool code to correct an issues in the self-calibrated PDSI display (Feb. 2015)

- Changed symbology and data sources for several of the reference layers in the web viewer to improve usability of the tool (Dec. 2014 – Feb. 2015)

Website

- The website for the DRA was launched in March, 2014. The URL is: <http://droughtatlas.unl.edu>.
- **WEB ANALYTICS (April 2014-May 2015)**
 - **10,133 visits**
 - **8,312 unique visitors**
 - **29,449 page views**
 - **2,042 International visits**
 - Canada: 150 visits
 - India: 143 visits
 - UK: 139 visits
 - China: 131 visits
 - Germany: 112 visits
 - **Top 5 states (visits):**
 - CA: 936
 - TX: 596
 - NE: 584
 - CO: 517
 - OK: 243
 - **Top 5 referring websites (visits):**
 - drought.gov (NIDIS portal): 2,709
 - drought.unl.edu (NDMC site): 1,857
 - climate.gov (NOAA climate): 120
 - news.unl.edu (UNL news): 118
 - hcn.org (High Country News): 83
 - **Social media visits: 288**
 - Twitter: 173 visits
 - Facebook: 89 visits
 - LinkedIn: 19 visits

6) Work directly with the NIDIS program office to include the information contained in the Drought Risk Atlas into the NIDIS portal (USDP).

- **COMPLETED:** This task was accomplished in Year 2 of the project and can be found on <http://drought.gov>

7) Explore and assess changes and/or trends in drought frequency and intensity across the United States.

- Analysis started in spring 2015 and we hope to have initial results in time for the final report. **(Ongoing)**

8) Support current and future NIDIS pilot DEWS programs.

- Was introduced at the Missouri Basin RDEWS kick-off meeting in Feb. 2014 and at the Inter-Tribal Bison Council and Missouri Basin Tribal meetings in Rapid City in Sept. 2014.
- Will be introduced at the NIDIS State Drought Coordinator meetings in July 2015 in Seattle.
- Will be introduced during the spinning up of the NIDIS Midwest and Pacific NW/Columbia Regional Drought Early Warning System efforts.

9) Work with our NOAA proposal partners to build capacity and produce educational/help materials to provide training to NOAA's operational climate services staff and their users on how to use the DRA.

- *A publication on the Drought Risk Atlas was published by the NDMC team in the Journal of Hydrology. You can find the open access publication here: <http://www.sciencedirect.com/science/article/pii/S0022169415000128>*
- Working with NIDIS and NWS-Climate Services to produce and provide a webinar and/or YouTube training module video on the Drought Risk Atlas. **(Underway)**
- *****NOTE: The DRA is being used as part of a multi-national research project funded by the Belmont Forum and the National Science Foundation, respectively, which partners the NDMC at UNL with researchers in Germany, United Kingdom and Australia. In this 3-year project, the team is looking at (among other things) identifying and comparing drought impacts (using the DRA for the U.S.) and physical drought indicators/indices.***
- **Mark Svoboda presented on the DRA at:**
 - Introduced the DRA for the InterTribal Buffalo Council Region 1 Drought Resiliency Workshop in Rapid City, SD. (April 2015)
 - Introduced the DRA for the NIDIS sponsored NE-KS Tribal Climate/Drought Workshop at UNL in Lincoln, NE. (April 2015)
 - Introduced the DRA at the Belmont/NSF DrIVER Stakeholder Workshop in Wallingford, England. (March 2015)
 - Introduced the DRA at the Czech Globe InterDrought Workshop in Brno, Czech Republic. (February 2015)

- Invited talk at the American Geophysical Union Annual Fall Meetings, San Francisco, CA (December 2014).
 - Invited presentation at the GEWEX/WCRP Global Drought Information System Workshop in Pasadena, CA (December 2014)
 - Presented at a North Carolina Water Utility Knowledge Gathering Workshop, Durham, NC (December 2014)
 - Invited keynote talk at the European Geophysical Union Leonardo Conference in Prague, Czech Republic. (November 2014)
 - Invited presentation at the World Bank's Building Drought Resilience Workshop in Washington, D.C. (November 2014)
 - Invited presentation at the Water for Food Global Conference in Seattle, WA. (October 2014)
 - Presented for a visit to the NDMC by USAID/ICBA. Lincoln, ND (Oct. 2014)
 - Invited presentation for the NIDIS Missouri Basin RDEWS Workshop on Extreme Events and Drought Resiliency for Tribes. Rapid City, SD (Sept. 2014)
 - Presented for the Inter-Tribal Buffalo Council's Drought Workshop in Rapid City, SD (September 2014)
 - Introduced the DRA at the South Dakota State Drought Plan Revision Kick-off Meeting in Pierre, SD. (September 2014)
 - Introduced the DRA for visiting technical staff from the Wind River Indian Reservation in Lincoln, NE. (July 2014)
 - Invited presentation at the North American Drought Monitor Forum in Toronto, Canada. (June 2014)
 - Presented at the AMS Applied Climate Meetings in Westminster, CO. (June 2014)
 - Presented for the Union of Concerned Scientists during collaborative meetings at UNL in Lincoln, NE. (April 2014)
 - Invited presentation for the Great Plains Symposium Annual Meeting in Lincoln, NE. (April 2014)
 - Invited seminar presentation for the Atmospheric Sciences Department at Colorado State University in Ft. Collins, CO. (March 2014)
 - Introduced the DRA at the Belmont/NSF DrIVER project kick-off meeting in Freiburg, Germany. (January 2014)
- **Brian Fuchs presented on the DRA at:**
 - Presented information on the DRA at the National VOAD Conference in Indianapolis, IN (May, 2014).
 - I introduced the DRA to the Centers for Disease Control during their initial drought webinar on (May, 2014).
 - The data from the DRA was discussed during a call about the Belmont DRIVER project on (June, 2014).
 - Information about the DRA was presented at the international SWAN conference in Seville, Spain (June, 2014).
 - Presented and demonstrated the DRA tool during the annual meeting of the Association of State Climatologists in Stevenson, WA (July, 2014).

- Introduced the DRA tool during the Western Governors Association meeting in Norman, OK (September, 2014).
- Presented the DRA at the Nebraska NRD's annual meeting in Kearney, NE on (September, 2014).
- Introduced the DRA to the Wind River tribal group during at workshop on the Wind River Reservation on (October, 2014).
- Discussed the DRA during a regional drought workshop in Barbados (January, 2015).
- Introduced the DRA at a "Farming for the Future" workshop in Bismarck, ND on (March, 2015).
- Did a live demonstration of the DRA at the Annual U.S. Drought Monitor Forum in Reno, NV (April, 2015).